1 Answer Key for exam2162sp07_vl

1. ⋄ $[``x=", 2, ``y=", -3, ``z=", 1, ``w=", -3, ``Mary", [63.5, 2, 1]]$

2. ⋄ ABC: $1 \leq L1$ $L2 \leq 1$ CDE: $L1 \leq 1$ $1 \leq L2$

3. ⋄ $$\begin{gathered} P = 1.8\,x + 1.8\,y + 1.5\,z \\ 0 \leq x\ ,\ 0 \leq y \\ 9\,x + 10\,y + 8\,z \leq 19000 \\ 6\,y + 5\,z \leq 10000 \\ 7\,x + 3\,z \leq 6000 \end{gathered}$$

4. ⋄ $P = 13$ at $x = 1$ $y = 2$.

5. ⋄

x	y	z	s	t	P	constants
1	1	0	1	0	0	15
2	0	1	0	1	0	9
-2	-2	-2	0	0	1	0

6. ⋄ column= 4

7. ⋄ P= $12\,u + 7\,v + 16\,w$

8. ⋄ P= 36 (x,y,z) $[0, 4, 0]$

9. ⋄ P= 88 (x,y,z) $[1, 26, 0]$

9. You are given the minimization problem:

Minimize the objective function: $C = 10\,x + 3\,y + 10\,z$

Subject to:

$28 \leq 2\,x + y + 5\,z$

$30 \leq 4\,x + y + z$

$x \geq 0, y \geq 0$ and $z \geq 0$

The final tableau **for the dual problem** is:

u	v	x	y	z	P	constants
0	0	2	−9	1	0	3
0	1	1/2	−1	0	0	2
1	0	−1/2	2	0	0	1
0	0	1	26	0	1	88

Using this give the solution to the primal problem (i.e. original minimal LPP):

Value of C= ☐ The point: (x , y , z)=(☐ , ☐ , ☐)

8. Here is an intermediate tableau associated with a maximal LPP.

x	y	z	s	t	P	constants
2	3	0	1	0	0	14
-1	1	1	0	-2	0	4
6	-6	0	0	15	1	12

i) Circle the pivot element and carry out the next iteration of the simplex method.

ii) Using your answer in the first part, report the solution to the original maximal LPP.

Value of P= [ ] (x , y , z)=([ ], [ ], [ ])

6. Here is an intermediate Simplex tableau associated with a maximal LPP.

x	y	z	s	t	u	P	constants
1	-6	-4	-3	0	0	0	5
0	7	0	-3	1	0	0	6
0	7	7	-1	0	1	0	5
0	4	6	-5	0	0	1	16

Explain why the LPP is unbounded (i.e. has no solution.)

7. Consider the minimization problem:

Minimize the objective function: $C = 7\,x + 5\,y$

Subject to:

$12 \le 5\,x + y$

$7 \le 2\,x + 2\,y$

$16 \le x + 4\,y$

$x \ge 0$ and $y \ge 0$

In solving the dual problem to this primal problem, what is the function to be maximized? Answer: P=

5. You are given the following maximal linear programming problem (LPP)

   Maximize the objective function: $P = 2\,x + 2\,y + 2\,z$

   Subject to:

   $$x + y \leq 15$$

   $$2\,x + z \leq 9$$

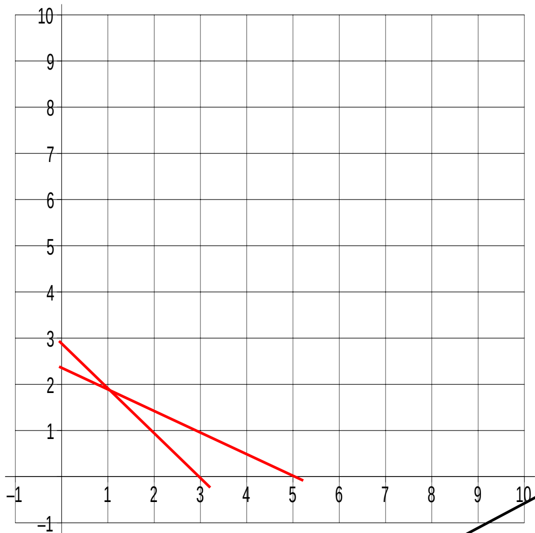
   $x \geq 0, y \geq 0$ and $z \geq 0$

   Fill in the rows in the initial Simplex tableau for this problem.

x	y	z	s	t	P	constants
						15
					1	

4. i) Sketch and shade the region described by the inequalities. Compute the coordinates of the corner points and mark them on your graph.

$$0 \le x \ , \ 0 \le y$$
$$3 \le x + y$$
$$5 \le x + 2\,y$$



This is C

ii) Find the minimum value of the function, $C = 3\,x + 5\,y$ on the region.

Answer: $P =$ ☐ at $x =$ ☐ ,$y =$ ☐ .

3. Set this problem up, by stating the chosen variables, the function to be maximized and **all** the inequalities. **Do not solve the problem.**

The juice company "So-cool" has three lines of juice mixes.

Each carton of blend A contains 9 ounces of strawberry concentrate and 7 ounces of banana paste.

Each carton of blend B contains 10 ounces of strawberry concentrate and 6 ounces of orange concentrate.

Each carton of blend C contains 8 ounces of strawberry concentrate, 5 ounces of orange concentrate and 3 ounces of banana paste.

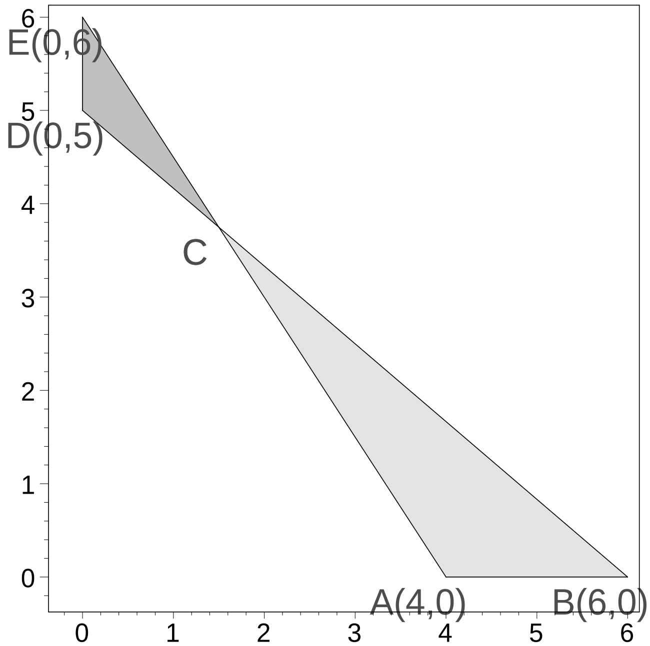
The company has 19000 ounces of strawberry concentrate, 10000 ounces of orange concentrate and 6000 ounces of banana paste in stock.

If the profits per carton of the blends A, B, C are $1.80, 1.80, 1.50$ dollars respectively, how many cartons of each blend should be produced?

Define each variable here:

Maximize: Profit $P =$
Subject to:

2. The displayed region has two triangles ABC and CDE.



The line AE is given by the equation $\frac{x}{4} + \frac{y}{6} = 1$ and the line BD is given by the equation $\frac{x}{6} + \frac{y}{5} = 1$.

Write a system of inequalities whose solution is the triangle ABC.

Triangle ABC

Write a system of inequalities whose solution is the triangle CDE.

Triangle CDE

1. (a) Suppose that

$$\begin{pmatrix} -4 & x & 2 \\ 2 & -4 & 3 \end{pmatrix} + 2 \begin{pmatrix} 0 & 3 & 5 \\ -5 & 2 & y \end{pmatrix} = \begin{pmatrix} -4 & 8 & 12 \\ -8 & 0 & -3 \end{pmatrix}.$$

Then we must have:

$x =$ and $y =$

(b) Suppose that

$$\begin{pmatrix} z & 0 & -4 \\ 5 & 1 & -5 \end{pmatrix} \begin{pmatrix} -5 & -5 \\ 4 & w \\ 5 & 3 \end{pmatrix} = \begin{pmatrix} -25 & -17 \\ -46 & -43 \end{pmatrix}.$$

Then we must have:

$z =$ and $w =$

(c)John and Mary bought notebooks of four different types. The number of notebooks bought by them is given in the following matrix.

$$A = \begin{pmatrix} 3 & 2 & 9 & 9 \\ 3 & 4 & 9 & 6 \end{pmatrix}$$

Here the two rows correspond to John and Mary respectively and the four columns correspond to the four types I,II,III,IV respectively.

The prices in dollars of each type of notebook is given in the following matrix.

$$B = \begin{pmatrix} 1.0 \\ 3.5 \\ 2.5 \\ 4.0 \end{pmatrix}$$

Now use the product AB to decide what Mary spent. Mary spent ☐ dollars as shown by the entry in row ☐ and column ☐ of AB.

DEPARTMENT OF MATHEMATICS

Ma 162 Second Exam vl Spring 2007

DO NOT TURN THIS PAGE UNTIL YOU ARE INSTRUCTED TO DO SO.

Instructions: Cell phones must be OFF and put away before you open this exam. **Be sure your name, section, and student number are filled in below. Also be sure to put your initials on each exam page.** There are 9 problems and 9 pages (including this one) on the exam.
Show your work and put your answers in the answer boxes provided. **Unsupported or misplaced answers will receive no credit and no partial credit will be given for an incorrect answer.** You may use calculators for completing numerical calculations. The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided **during the exam.**

Problem	Maximum Score	Actual Score
1	18	
2	10	
3	15	
4	17	
5	10	
6	4	
7	12	
8	10	
9	4	
Total	100	

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